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I. Introduction

In recent years, Northern California has been the site of several catastrophic industrial incidents that exposed large numbers of people to toxic chemicals, resulting in complex class action litigation. These events have included the release of a chemical mixture from a processing tower at the Unocal Refinery in Rodeo, California, between August 22, 1994 and September 6, 1994;[1] the discharge of sulfuric acid mist from a rail car at the General Chemical Corporation (GCC) plant in Richmond, California, on July 26, 1993[2]; and the Sacramento River spill of July 14, 1991, in which a train derailed near the Northern California town of Dunsmuir.[3]

California courts, like those of many other states, have recognized that the class action device provides a superior method of resolving the enormous number of claims that can arise from a mass toxic disaster. The class procedure has permitted resolution of such incidents within two to three years—from the date of the disaster until claims are paid. In the GCC and *Sacramento River Spill* cases, the class mechanism was applied to effectively resolve the litigation by defining the class of persons entitled to recover damages, and providing for fair, equitable and prompt distribution of settlement funds. The principal benefits of the class device are: (1) elimination of the need for hundreds or thousands of plaintiffs to repeat the same proof as to common issues, thereby resulting in significant savings of time and money for the parties and the courts; (2) achievement of global resolution by encompassing all claims (except for those of opt outs) within a single proceeding; and (3) court supervised distribution of both compensatory and punitive damages to all class members, thereby eliminating the race to the courthouse.

This article summarizes applicable California law concerning the use of the class action device in mass toxic disasters, discusses some of the factors that make the class action device superior in these cases, and provides useful information to practitioners concerning the factual and legal issues that commonly arise in these important and complex matters.

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1. *In re* Unocal Refinery Litigation, No. C-94-04141 (Contra Costa County Super. Ct. Jan. 10, 1996). Approximately 40 complaints have been consolidated and are pending. In January 1996, the Court issued an Order denying defendants' demurrer to class action allegations.

2. *In re* GCC Richmond Works Cases, No. 2906 (Contra Costa County Super. Ct. Nov. 22, 1995). On November 22, 1995, the Court (Hon. Richard L. Patsey) issued an Order Granting Motion for Final Approval of Class Settlement and Implementing Pretrial Orders. The Court's Order has been appealed, and appeals are pending.

3. *In re* Sacramento River Spill Cases No. I & II, Nos. 2617 and 2620 (S.F. Super. Ct. Sept. 20, 1993). On September 20, 1993, the Court issued an Order of Final Approval of Settlement on a classwide basis. Appeals from that Order were voluntarily dismissed prior to any appellate decisions, and the Order of Final Approval is the subject of a final judgment.

II. Certification of Mass Torts Under California Law

A. Federal Precedents Allow Class Certification in Mass Toxic Tort Cases.

In the past, state and federal courts often adopted the reasoning of a 1966 Federal Advisory Committee Note to Federal Rule of Civil Procedure 23,[4] to the effect that mass torts were usually not suitable for class certification.[5] However, by the early 1980's, Professor Charles Alan Wright, one of the most distinguished members of that committee, had become "profoundly convinced" that the Advisory Committee's position was mistaken. Instead, Professor Wright stated that "[u]nless we can use the class action and devices built on the class action, our judicial system is simply not going to be able to cope with the challenge of the mass repetitive wrong ... "[6] Similarly in 1986, Professor Herbert Newberg, author of the definitive treatise on class actions,[7] found that "[m]ass tort class actions are rapidly emerging as a way to handle claims resulting from negligent acts or defective or toxic products affecting groups of similar parties."[8] Professor Newberg's change of heart coincided with a judicial trend approving the class device in the mass tort setting. For example, in *In re* A.H. *Robins*, the Fourth Circuit Court of Appeals cited Newberg's revised opinion in support of its own conclusion that the courts were properly "abandoning their historical reluctance to certify mass tort class actions in light of what is often an overwhelming need to create an orderly, efficient means for adjudicating hundreds or thousands of related claims."[9]

In *Jenkins v. Raymark Industries, Inc.*,[10] the Fifth Circuit Court of Appeals issued a landmark decision which approved of class certification on issues of liability and punitive damages in litigation involving multiple asbestos exposure claims.[11] *Jenkins* acknowledged that prior decisions had rejected class certification in the mass accident or tort setting primarily because of differences between individual plaintiffs' damages. However, citing the need to "change and invent" in response to new conditions, the court ultimately held that class certification was "clearly superior to the alternative of repeating, hundreds of times over," the proof of liability and science issues common to all plaintiffs.[12] Accordingly, the Court found that the class had been properly certified as to such common issues, while reserving individual issues of damage for later minitrials.[13] In *Sterling v. Velsicol Chemical Corporation*,[14] the Sixth Circuit similarly held that a toxic exposure case resulting from ground water contamination was properly certified as a class action because of the predominance of common issues of liability, punitive damages and the toxic nature of the chemicals to which plaintiffs were exposed.[15]

Together, A.H. *Robins*, *Jenkins* and *Sterling* provide persuasive authority for the modern view that class actions are a superior alternative to the traditional method of case-by-case adjudication in mass tort toxic exposure cases.

B. California Appellate Decisions Concerning Class Actions In Mass Tort Cases.

The California Supreme Court has never issued a specific ruling on the applicability of the class action device in mass toxic tort cases in this state. Some older California decisions indicate the same resistance to the class device that was previously found in federal mass tort cases, and those decisions commonly cite the above-referenced Federal Rules Advisory Committee Note as authority for denying class certification.[16] Moreover, in a case involving the question of whether the statute of lim-

4. Fed. R. Civ. P. 23 advisory committee's note (28 U.S.C.A § 23).

5. *See, e.g.*, Rose v. Medtronics, Inc., 107 Cal. App. 3d 150, 155 (1980). *Rose* involved allegedly defective pacemakers. The court upheld a demurrer to class certification, citing the Advisory Committee note.

6. *In re* School Asbestos Litigation, Master File No. 83-0286, Tr. at 106 (E.D. PA) (Statement of Professor Charles Alan Wright, class action argument, July 30, 1984) (quoted in *In re* A.H. Robins, 880 F.2d 709, 731 (4th Cir. 1989)).

7. HERBERT B. NEWBERG, NEWBERG ON CLASS ACTIONS (3d ed. 1992).

8. Herbert B. Newberg, *Mass Tort Class Actions*, TRIAL, Feb. 1986, at 53.

9. *In re* A. H. Robins, 880 F.2d at 731-732. Federal Rule of Civil Procedure 23 and all case law thereunder has been expressly adopted by the California Supreme Court for use by the state's trial courts in making their class certification decisions. *See* Vasquez v. Superior Court of San Joaquin County, 4 Cal. 3d 800, 821 (1971); Daar v. Yellow Cab Co., 67 Cal. 2d 695, 709 (1967); *see also* Bell v. American Title Ins. Co., 226 Cal. App. 3d 1589, 1603 (1991); NEWBERG, *supra* note 7, § 13.17. In 1970 the California Legislature enacted Civil Code section 1781, which is identical to Federal Rule 23 with respect to its class certification prerequisites. *See* Schneider v. Vennard, 183 Cal. App. 3d 1340, 1345 (1986). While section 1781 expressly applies to consumer class actions, its enactment is indicative of California's adoption of federal law pertaining to class actions of any kind. *See Vasquez*, 4 Cal.3d at 820.

10. 782 F.2d 468 (5th Cir. 1986).

11. *Id.* at 473.

12. *Id.*

13. *Id.*

14. 855 F.2d 1188 (6th Cir. 1988).

15. *Id.* at 1196-97.

16. *See, e.g., Rose*, 107 Cal. App. 3d at 154-155 (class action denied as to alleged heart pacemaker defects).

itations had been tolled by the filing of a class action, the California Supreme Court stated, in *dicta*, that personal injury claims are generally inappropriate for class treatment.[17]

Despite these older authorities, the more recent California Supreme Court decisions in *Christiansen v. Superior Court*,[18] and *Potter v. Firestone Tire & Rubber Co., Inc.*[19] offer support for the emerging view that class actions are appropriate in mass tort cases, including those alleging toxic exposure. In *Christiansen*, a personal injury case involving over 16,000 claims for emotional distress arising from the mishandling of cremated remains, the Court stated, "[t]*he class of potential plaintiffs we approve here* is limited in number. ..."[20] Following the Supreme Court decision, the trial court certified a class for settlement purposes.[21] Thus, individual issues pertaining to emotional distress in *Christiansen* did not preclude class certification, because of the predominating common issues pertaining to liability and punitive damages for a continuing course of conduct by defendants.

In *Potter v. Firestone*, the California Supreme Court addressed the availability of damages for fear of cancer and medical monitoring, where plaintiffs had been exposed to drinking water contaminated with carcinogens from a nearby toxic dump. Although the case was not filed as a class action, the court referred to the "class of potential plaintiffs" on numerous occasions, noting that "a single class action may easily involve hundreds, if not thousands, of fear of cancer claims."[22] The court also expressed its concern that if fear of cancer damages were awarded "in large class actions, liability for this one type of injury alone would be staggering."[23] Significantly, the court resolved this dilemma by adopting pleading standards that would impose limitations on the size of the potential class of plaintiffs, rather than by rejecting the use of the class action device in toxic exposure cases. In particular, the court held that a toxic exposure plaintiff who could only show negligent conduct by the defendant was required to demonstrate "that it is more likely than not that the plaintiff will develop the cancer in the future due to the toxic exposure," in order to recover for fear of cancer.[24] Alternatively, if the plaintiff could demonstrate that the defendant's conduct met the standard for punitive damages under California Civil Code Section 3294, the plaintiff could recover for fear of cancer upon proof of exposure, significant increase in plaintiff's risk of cancer, and a reasonable fear corroborated by reliable medical or scientific opinion, without having to prove that plaintiff would "more likely than not" develop cancer.[25]

While neither *Christiansen* or *Potter* specifically ruled on a class certification order in the context of a mass tort or toxic exposure case, each decision arguably provides implicit authority that such cases are appropriate for class treatment, by approving classes of potential plaintiffs and declining to take the obvious opportunity to reject the possibility of class certification. However, a very recent appellate decision raises numerous questions as to the state of mass tort class certification law in California. In *Kennedy v. Baxter Healthcare Corporation*,[26] plaintiffs sought to certify a personal injury class against Baxter and others in connection with allergies and medical problems allegedly related to repeated exposure to latex gloves. The trial court dismissed the class allegations on demurrer and the Court of Appeals affirmed the lower court decision.[27] In affirming, the Court of Appeal cited *Clausen v. San Francisco Unified School District*[28] which held that "the wide disparity in individual claimants' damages and the diverse issues of liability and causation as to each individual claimant preclude maintenance of the suit as a class action."[29] The *Kennedy* decision also cited *Jolly v. Eli Lilly Company*,[30] wherein the California Supreme Court stated a similar view in dicta.[31]

In *Kennedy*, the Court of Appeal noted that "[w]hat is critical is whether common issues predominate. In some mass torts, that question may be answered in the affirmative, while in others individual questions may outnumber common questions."[32] The court then made extensive references

17. Jolly v. Eli Lilly & Co., 44 Cal. 3d 1103, 1122-1123 (1988).

18. 54 Cal. 3d 868 (1991)

19. 6 Cal. 4th 965 (1993).

20. 54 Cal. 3d. at 900 (emphasis added). The class had not yet been certified at the time of the Supreme Court's decision in *Christiansen*. However, the court's opinion stated that it "approved" the class and made repeated references to the propriety of class certification, from which its implicit acceptance of the class may be inferred.

21. *Sconce/Lamb Cremation Cases*, No. 2085 (L.A. Super. Ct. Mar. 24, 1992).

22. 6 Cal. 4th at 991.

23. *Id.* at 993.

24. *Id.* at 997.

25. *Id.* at 997-1000.

26. No. C018845, 1996 Cal. App. LEXIS 245 (N.D. Cal. Fed. 28, 1996).

27. *Id.* at *2.

28. 221 Cal. App. 3d 1224 (1990).

29. *Id.* at 1234.

30. 44 Cal. 3d. 1103 (1988).

31. *Kennedy*, 1996 Cal. App. LEXIS 245, at *16-17.

32. *Id.* at *16 n.6.

to the evidentiary record, which demonstrated the predominance of individual questions in that case. For example, the latex gloves were manufactured by several companies throughout the United States, Sri Lanka, Malaysia, and Indonesia, raising questions about variations from uniform manufacturing formulae. Moreover, questions were also raised as to whether each defendant knew, or should have known, that the product could have caused injury to plaintiffs. "The question of liability for each defendant thus turns on separate factual issues."[33] Individual statute of limitations issues were also raised because many workers had used latex gloves for a period of time exceeding the statutory period.[34] Establishment of a breach of warranty would have required plaintiffs to provide individual proof of privity, by showing that they purchased the gloves directly from the defendants' distributors.[35]

The Court of Appeal also focused on individual questions as to causation and damages: why some plaintiffs suffered only minor skin irritation while others suffered life-threatening allergic reactions; whether registered nurses who suffered minor skin irritation might have believed that the reaction was due to the latex gloves but decided to wear the gloves to protect against other hazards; and most importantly, the fact that latex is a common material found in countless products which may have caused or contributed to plaintiffs' alleged injuries. Thus, plaintiffs could have suffered the allergic reactions by using dishwashing or gardening gloves at home, or through contact with "balloons, paint, condoms, clothing or any of numerous other latex items."[36] Finally, the court took note of defense expert evidence that allergic reactions may have been caused by the interaction of latex with certain foods, bringing into question the diet of each plaintiff.[37]

The *Kennedy* decision may present both an obstacle to, and an opportunity for, plaintiffs seeking to certify classes in mass toxic tort cases. On the one hand, *Kennedy* endorses, and arguably revitalizes, the holdings and *dicta* of cases that predate *Christiansen* and *Potter* to the effect that mass torts are not well-suited for class certification. On the other hand, *Kennedy* is the first California appellate decision to explicitly acknowledge that common questions may predominate in some mass torts,[38] and counsel seeking to certify a class could readily distinguish the facts of most mass toxic torts from those that were presented in *Kennedy* itself.

For example, mass toxic disasters, such as the *Sacramento River Spill* or *General Chemical* sulfuric acid discharge, commonly involve exposure to chemicals as a result of a single course of conduct by a single defendant. Thus, there would be no individual questions as to exposure to the different formulations used by various manufacturers, and liability would turn on a single set of facts as to all plaintiffs. Because accidents discharge chemicals that are not usually present in plaintiffs' environments, the court would not be faced with the confounding effect of individual plaintiffs' histories of exposures to similar compounds from other products. Where the complaint involves a single incident, all plaintiffs would be subject to the same statute of limitations, in contrast to the ongoing exposures and individual limitations issues in *Kennedy*. Industrial accidents generally do not involve claims for breach of warranty, because the product is not being used in its intended fashion when it escapes from a container and causes environmental exposures, and thus the problematic individual issues of privity found in *Kennedy* would be absent in most mass toxic tort cases.

The primary issues raised by *Kennedy* which are likely to exist in any mass toxic tort case, and which may be troublesome to a California court considering class certification, are those pertaining to causation and damages. While the *Kennedy* decision expressed concern about those subjects, the court did not find that individual issues of damages alone would defeat class certification. Thus, the question remains as to the effect of such issues on class certification under California law.

There are two distinct approaches to resolve this apparent conflict between individual issues of causation and the requirement that common issues predominate in order to certify a class. The modern view, espoused by *Robins*, *Sterling* and *Jenkins*, is that a class may be certified with respect to the common questions of liability and punitive damages, while individual matters pertaining to causation and compensatory damages are reserved for summary proceedings after the trial of common issues.[39] Some California courts have approved of this procedure.[40] However, in light of the uncertainty of California appellate authority as to the acceptabili-

33. *Id.* at *18.

34. *Id.* at *19.

35. *Id.* at *18-19.

36. *Id.* at *19-20.

37. *Id.* at *20.

38. *Id.* at *17 n.6.

39. *See, e.g., Jenkins*, 782 F.2d at 473-474; *Sterling*, 855 F.2d at 1196-97.

40. *See, e.g.*, Alviso Community Org. v. Maciel, No. 723808 (Santa Clara County Super. Ct. Jan. 19, 1994) (Order on Class Certification).

ty of this method, counsel seeking to certify a class on a contested basis may choose to submit evidence to show that the proposed class members' injuries are similar in type and degree, and that class certification is therefore proper *even if* causation and damage issues are considered. For example, exposure to an irritant such as sulfuric acid mist may produce many common injuries, such as burning eyes and difficulty breathing, among large numbers of exposed people.[41] The success of the latter approach will depend upon the circumstances of each case, including the similarities of the degrees of exposures and types of injuries.[42] The better view is to certify the class for purposes of trial of the common issues, reserving the individual damages issues for post-trial proceedings.

As will be explained in the following section, some California superior court judges have explicitly approved class actions in toxic exposure cases, despite the absence of directly applicable California appellate authority. After the *Kennedy* decision, the trial courts may well be called upon to compare and contrast the facts in *Kennedy* from those presented by each class certification motion to determine whether common issues predominate over individual issues.

C. California Superior Courts Have Approved Class Certification in Mass Toxic Tort Cases, and the Appellate Courts Have Denied Writs of Prohibition and *Certiorari* as to Such Orders

In *In re* GCC *Richmond Works*,[43] the coordination trial judge issued a decision approving of a class settlement involving over 50,000 claims for damages resulting from the release of sulfuric acid from a tank car at defendant's facility in Richmond, California on July 26, 1993.[44] The decision approved a settlement which established two opt out compensatory damage classes and one mandatory punitive damages class.[45] Objections on the basis of disparities in damages between plaintiffs were rejected by the court, which found that "[i]ndividual differences in damages do not preclude class representation," and that "[t]ypicality of claims is not required for representatives of a punitive class where the focus is on the defendant's conduct and involves the same evidence for all claimants."[46]

In approving the mandatory punitive damage class, the court relied upon *Bell v. American Title*,[47] which had approved a mandatory, non opt out class in a consumer fraud case.[48] The court also followed *In re Agent Orange*,[49] which endorsed the mandatory punitive damage class on the basis of a "limited fund" theory. According to this view, where there are multiple claimants and there is a risk that individual litigation would allow those who sue first to deplete the fund, leaving nothing for latecomers, then fundamental fairness dictates that punitive damages should be equitably distributed to the entire class of eligible claimants.[50]

The GCC decision represents a persuasive example of the Contra Costa County Superior court's authority to apply the class device to resolve complex toxic tort litigation. Numerous other California superior courts have followed similar logic in approving of class actions in mass torts and toxic exposure cases. Pertinent rulings include the superior court decisions permitting class certification for personal injuries and punitive damages in the toxic exposure case of *Alviso Community Organization v. Maciel*;[51] for emotional distress claims in *Noerdinger v. City of Santa Clara*,[52] and *City of Santa Clara v. Santa Clara County Superior Court*;[53] *In re Sconce/Lamb Cremation Cases*[54] as well as the orders of the San Francisco County Superior court in *In re*

41. *See* part IV, *infra*.

42. *Id.*

43. No. 2906 (Contra Costa County Super. Ct. Nov. 22, 1995).

44. *Id.* (Decision Re: Final Approval, Fees and Related Matters, Nov. 13, 1995). Class certification was opposed by a small group of plaintiffs' counsel who objected to the settlement as a whole, and appeals are pending.

45. *Id.*, slip op. at 4.

46. *Id.*, slip op. at 11.

47. 226 Cal. App. 3d 1589 (1991).

48. *Id.* at 1601-1611.

49. 100 F.R.D. 718 (E.D.N.Y. 1983), *mandamus denied*, 725 F.2d 858 (1984).

50. 100 F.R.D. at 725 (cited in *In re* GCC Richmond Works, No. 2906, Decision at 9). In the *In re Exxon Valdez case*, No. A89-0095-CV, Order No. 180 Supplement (D.C. Alaska Mar. 8, 1994) (Decision Regarding Certification of Mandatory Punitive Damages Class), the district court followed *In re Agent Orange*, and certified a punitive damages class under the "limited punishment" theory. The court found that

> claimants who are first to recover may be awarded punitive damages sufficient to punish and assure deterrence. Substantive due process having been satisfied, later claimants may be precluded from recovering punitive damages. These considerations, along with due process concerns, fit within the parameters of [Federal Rule of Civ. Proc.] 23(b)(1)(B) in that 'adjudication with respect to individual members of the class ... would as a practical matter be dispositive of the interests of the other members ... not parties to the adjudication ...

Id. at 9-10. The Ninth Circuit Court of Appeals denied a writ petition by plaintiffs who opposed the mandatory punitive damages class.

51. No. 723808 (Santa Clara County Super. Ct. Jan. 19, 1994).

52. No. 672565 (Santa Clara County Super. Ct. Oct. 17, 1990).

53. No. H007628 (Cal. App. Nov. 14, 1990).

54. No. 2085 (L.A. Super. Ct. May 10, 1993); No. S018104 (Cal. Nov. 14, 1990).

Sacramento River Spill, certifying classes for personal injury, property devaluation, business loss and evacuation expenses, in a mass tort case arising from a train derailment and toxic injuries that were caused by the dumping of a tankcar of herbicide into the Sacramento River.[55] The California Supreme court and/or courts of appeal have summarily denied writs of mandate and certiorari with respect to the class certification orders in several such cases, including *Alviso* and *Noerdinger*, cited above. Such denials indicate that the appellate courts are unlikely to interfere with the trial courts' discretion to approve of the class action device to manage complex toxic tort litigation.[56]

III. Admissibility and Necessity of Scientific Evidence to Prove Causation of Injury

The issues pertaining to admissibility of scientific evidence have been the focus of great judicial attention in recent years. These issues are especially important in toxic tort class actions, which depend heavily upon expert proof.[57]

In *Daubert v. Merrell-Dow Pharmaceuticals, Inc.*[58] the United States Supreme Court addressed the standards for admissibility of expert opinions in federal courts for the first time since the adoption of the Federal Rules of Evidence. *Daubert* assigned a "gatekeeper" function to the federal district courts with respect to reliability of experts' methodology and opinions.[59] The Supreme Court declined to set forth a "definitive checklist or test," but did cite several factors that federal judges may consider in determining whether to admit expert scientific testimony under Federal Rules of Evidence 702. Such considerations included: whether the theory or technique employed by the expert is generally accepted by the scientific community; whether it has been subjected to peer review and publication; whether it can be, and has been tested; and whether the known or potential rate of error is acceptable.[60]

Interpretation of the *Daubert* case has generated a great deal of disagreement among the federal district and appellate courts.[61] While *Daubert* itself reversed a decision excluding expert testimony, it would be a mistake to conclude that Daubert loosened the standards as to expert evidence. To the contrary, many district courts have strictly performed the "gatekeeper" function to exclude expert evidence of toxic injury, resulting in dismissal on summary judgment for defendants.[62]

The California Supreme Court recently declined to adopt the *Daubert* standard, in a criminal case involving admissibility of field sobriety testing.[63] Instead, the court chose to retain California's *Kelly* test, which requires that a particular expert opinion must be based on a scientific principle "sufficiently established to have gained general acceptance in the particular field in which it belongs."[64] *People v. Leahy* found that "'general acceptance' does not require unanimity, a consensus of opinion, or even majority support by the scientific community."[65] Instead, the standard requires "consensus drawn from a typical cross-section of the relevant, qualified scientific community."[66] The Court also made clear that the *Kelly* rule only applies to "new scientific techniques," and stated that the question of whether a scientific technique is "new" for this purpose depends upon whether there has been "repeated use, study, testing and confirmation by scientists or trained technicians."[67]

Thus, the parties may engage in a preliminary contest over whether the expert opinions offered in the case are based on "new" scientific techniques. If not, then the *Kelly* standard is inapplicable, and admissibility would be governed only by California Evidence Code Section 720, which defines the qualifications to testify as an expert, and Section 801, which permits an expert to state an opinion that is

> (a) Related to a subject that is sufficiently beyond common experience that the opinion of an expert would assist the trier of fact; and (b) based on matter (including his special knowledge ...) perceived by or personally known to the witness ..., whether

55. Nos. 2617 and 2620 (S.F. Super. Ct. Aug. 28, 1992 and March 3, 1993).

56. *See also Kennedy*, 1996 Cal. App. Lexis 245, which indicates that the appellate courts are equally unlikely to interfere with a trial court's discretionary decision not to certify a mass tort class.

57. *See, e.g.*, Cottle v. Superior Court, 3 Cal. App. 4th 1367 (1992), discussed *infra*.

58. 113 S. Ct. 2786 (1993).

59. *Id.* at 2798.

60. *Id.* at 2796-97.

61. *See, e.g.*, Jonathan M. Hoffman, *Expert Testimony Since Daubert: A Major Shift*, Toxics Law Reporter No. 9, 252-262 (Aug. 3, 1994).

62. *See, e.g.*, Casey v. Ohio Medical Products, 877 F. Supp. 1380 (N.D. Cal. 1995) (granting summary judgment based upon exclusion of expert testimony, following *Daubert*). *See also* Hoffman, *supra* note 61.

63. People v. Leahy, 34 Cal. Rptr. 2d 663 (1994).

64. *Id.* at 667 (quoting People v. Kelly, 17 Cal.3d 24, 30 (1976)).

65. 34 Cal. Rptr. at 671.

66. *Id.* at 679.

67. *Id.* at 674.

> or not admissible, that is of a type that reasonably may be relied upon by an expert in forming an opinion upon the subject to which his testimony relates, unless an expert is precluded by law from using such matter as a basis for his opinion.

Expert testimony is absolutely essential to proof of causation in toxic tort cases, and recent California appellate decisions are indicative of the outcome-determinative impact of the battle over admissibility of expert evidence. In *Cottle v. Superior Court*, the Court of Appeal held that "[t]he law is well-settled that in a personal injury action causation must be *proven within a reasonable medical probability based upon competent expert testimony.*"[68] The Court held that plaintiffs failed to make a *prima facie* case that their injuries were caused by chemical exposure, where plaintiffs' experts submitted declarations that were mere "statements of possibility instead of probability" of causation.[69] The trial court had issued a case management order which directed each plaintiff to file a statement establishing a *prima facie* claim stating the following information: "the chemical or toxic substance to which that plaintiff was exposed; the date or dates and place of exposure; the method of exposure; the nature of plaintiff's injury; and the identity of each medical expert who will support the plaintiff's personal injury claim."[70]

Plaintiffs responded to the case management order by stating that it was "impossible to assign specific chemicals as having caused specific conditions in specific individuals" under the circumstances of the case.[71] Plaintiffs also admitted that none of them "had been diagnosed as having any illness or injury caused by exposure to the chemicals."[72] Plaintiffs' experts' declarations stated that plaintiffs had been placed at significantly increased risk, and that similar illnesses were "associated with" toxic exposure, but did not meet the standard of reasonable medical probability.[73] Accordingly, dismissals of plaintiffs' personal injury claims were upheld on appeal.[74]

Similarly, in *Akins v. Sacramento Municipal Utilities District*,[75] the Third District Court of Appeal dismissed plaintiffs' claims for alleged radiation injuries, finding insufficient expert evidence of causation. The court devoted great attention to the issue of exposure, rejecting plaintiffs' argument that it would be "impossible to calculate potential dosages."[76] In the absence of contrary evidence from plaintiffs, the court accepted defense expert testimony that plaintiffs' exposure levels were "trivial and insignificant."[77] The court also suggested that "a fairly accurate measure of dosage" could be produced from plaintiffs' recollection and "extrapolation from actual test results for pathways of exposure."[78]

Lineaweaver v. Plant Insulation Company[79] also demonstrates the dispositive effect of the presence or absence of evidence of exposure. In that case, three plaintiffs filed suit against numerous asbestos suppliers for personal injuries allegedly sustained as a result of repeated exposure to asbestos products. Although all three plaintiffs persuaded the jury that they had suffered damages as a result of exposure to asbestos, two plaintiffs suffered non-suits because they failed to provide sufficient evidence of exposure to asbestos manufactured by the particular defendant against whom the trial had proceeded.[80] The Court reaffirmed plaintiff's duty to establish causation to a "reasonable medical probability based upon competent expert testimony that the defendant's conduct contributed to plaintiff's injury."[81] One of the three plaintiffs did provide "circumstantial evidence ... sufficient to support a reasonable inference of exposure," and the Court of Appeal reversed the non-suit as to that plaintiff only.[82]

Lineaweaver emphasizes the importance of "[f]requency of exposure, regularity of exposure, and proximity of the asbestos product" to demonstrate causation, while citing additional relevant factors such as the type of asbestos to which plaintiff was exposed, the type of injury suffered, and other possible sources of plaintiff's injury.[83] "Ultimately, the sufficiency of the evidence of causation will depend on the unique circumstances of each case."[84] While *Lineaweaver* involved questions of exposure which generally do not arise in a mass disaster case where the defendant is readily identifi-

68. 3 Cal. App. 4th at 1367, 1384 (emphasis in original).

69. *Id.* at 1387.

70. *Id.* at 1373.

71. *Id.* at 1375.

72. *Id.* at 1382.

73. *Id.* at 1386.

74. *Id.* at 1389.

75. 18 Cal. App. 4th 208 (1992).

76. *Id.* at 235.

77. *Id.* at 239.

78. *Id.* at 235.

79. 31 Cal. App. 4th 1409 (1995).

80. *Id.* at 1412.

81. *Id.* at 1416.

82. *Id.* at 1420.

83. *Id.* at 1416.

84. *Id.* at 1417 (quoting Lockwood v. AC & S, Inc., 109 Wash. 2d 235 (1987)).

able, the factors cited by the Court of Appeal in *Lineaweaver* are relevant to any toxic tort causation analysis.

The appellate authorities provided in the *Cottle, Akins,* and *Lineaweaver* decisions clearly stand for the proposition that plaintiffs bear the burden of providing such estimates of toxic exposure as the circumstances permit, and proving that their exposure was sufficient to cause injury. Failure to meet the applicable standard will result in dismissal. Thus, it is not surprising that these expert-intensive subjects give rise to a great deal of the contested issues in toxic tort litigation, some of which are described in section IV, below.

IV. The California Supreme Court Has Approved of Recovery For Medical Monitoring, and Such a Remedy is Well-Suited for Class Certification

In *Potter v. Firestone,* the California Supreme Court stated, for the first time, that medical monitoring is a proper form of relief for toxic exposure.[85] The Court held:

> the cost of medical monitoring is a compensable item of damages where the proofs demonstrate, through reliable medical expert testimony, that the need for future monitoring is a reasonably certain consequence of a plaintiffs' toxic exposure and that the recommended monitoring is reasonable. In determining the reasonableness and necessity of monitoring, the following factors are relevant: (1) the significance and extent of the plaintiff's exposure to chemicals; (2) the toxicity of the chemicals; (3) the relative increase in the chance of onset of disease in the exposed plaintiff as a result of the exposure, when compared to (a) the plaintiff's chances of developing the disease had he or she not been exposed, and (b) the chances of the members of the public at large of developing the disease; (4) the seriousness of the disease for which the plaintiff is at risk; and (5) the clinical value of early detection and diagnosis. Under this holding, it is for the trier of facts to decide, on the basis of competent medical testimony, whether and to what extent the particular plaintiff's exposure to toxic chemical in a given situation justifies future periodic medical monitoring.[86]

As framed by *Potter,* many of the issues relevant to the availability of medical monitoring may be common to a large number of plaintiffs, and thus appropriate for trial on a class basis. Items 2, 4 and 5 (toxicity of the chemicals, seriousness of the disease for which the which plaintiff is at risk, and clinical value of early detection and diagnosis) will almost always be common issues to each plaintiff, in a mass disaster where all plaintiffs are exposed to the same chemical. Thus, while plaintiffs and defendants may disagree as to how toxic the chemicals are, or how serious the potential disease may be, those disputes would be applicable to each plaintiff's claim for medical monitoring. If the jury found that the chemicals were sufficiently toxic, and the potential disease were sufficiently serious, those factors would support monitoring, and vice versa. The significance and extent of plaintiffs' exposures to chemicals can also be demonstrated on a basis common to the entire class. Expert testimony may be developed to show that all individuals within a particular geographic zone were probably exposed to particular amounts of toxic chemicals, and that such exposures were or were not sufficient to cause a significant increase in the risk of serious disease.[87]

A number of courts have found that class certification is appropriate with respect to medical monitoring relief, based upon the predominance of common issues. In *Day v. NLO, Inc.,*[88] the federal district court certified a medical monitoring class of persons "allegedly exposed to dangerous levels of radioactive materials" at a factory over a 30-year period.[89] The Sixth Circuit Court of Appeals denied defendants' attempt to reverse the district court's order by writ of mandamus.[90] In *Craft v. Vanderbilt Univ., et al.,*[91] another district court in the same circuit certified several classes, including a medical monitoring class, with respect to a group of over 800 women who allege that they ingested a radioactive iron cocktail during pregnancy, without their knowledge or consent, during an experiment conducted in the 1940's at a prenatal clinic.[92] Shortly after the *Potter* decision was issued, the Santa Clara County Superior Court certified a medical monitoring class in a case involving exposure to asbestos

85. 6 Cal. 4th 965, 1009 (1993).

86. *Id.*

87. *See infra* parts IV and V for a discussion of the evidentiary and practical issues pertaining to proof of exposure and injury.

88. 144 F.R.D. 330 (S.D. Ohio 1992).

89. *Id.* at 333.

90. *In re* NLO, Inc., 5 F.3d 154, 159-160 (6th Cir. 1993).

91. Craft v. Vanderbilt Univ., No. 3-94-0090 (M.D. Tenn. July 14, 1994).

92. *Id.* (Order and Memorandum of Decision).

and diesel fumes.[93] Petitions for writs of mandate and review were denied as to the Superior Court's decision, by the Court of Appeal and California Supreme Court, respectively.[94]

The California Supreme Court has noted that medical monitoring relief is warranted, in part, because of the "important public health interest in fostering access to medical testing for individuals whose exposure to toxic chemicals creates an enhanced risk of disease," the "deterrence value in recognizing medical surveillance claims" against those who discharge toxic chemicals, and "societal notions of fairness and elemental justice."[95] In appropriate cases, where substantial numbers of plaintiffs have been exposed to radiation, asbestos or other agents capable of causing cancer or other latent illnesses, the interests of the parties and the courts will be well-served by the efficiencies and economies of a single, class-wide determination of entitlement to medical monitoring damages.

V. Practical Considerations: Proof of Causation and Injury

The fundamental issue in any personal injury case is whether the defendant's conduct caused or was a substantial factor contributing to an injury suffered by the plaintiff.[96] This issue is complicated in toxic tort mass disaster litigation in two important ways. First, proof of toxic exposure and injury is a highly specialized area of science and medicine, which depends upon development of admissible expert evidence from a number of diverse, interdependent specialties. Even when the facts of a particular case clearly demonstrate negligence, defendants commonly attempt to defeat or minimize plaintiffs' claims, by motions *in limine* to exclude expert testimony, and by developing defense evidence to argue that the exposure in question did not cause injury to plaintiff.[97] Second, in a mass exposure case, counsel must determine who the class members are, by establishing the times and locations where members of the community probably were exposed.

In order to address these complex issues, counsel must construct a chain of proof leading from the source of the chemical release to the plaintiffs' alleged injuries. The links in this chain include the following: (1) determination of the amounts and type of chemicals released; (2) identification of chemicals to which plaintiffs were exposed, including any breakdown products formed after the initial release; (3) determination of where the chemicals went, and in what amounts and concentrations; (4) establishment of the types of injuries that can be caused by particular concentrations of these chemicals; and (5) expert medical testimony that a particular exposure probably caused or was a substantial factor contributing to the injuries alleged by plaintiffs.

It is significant that the first four elements of proof set forth above are common to all potential class members in a mass toxic tort case, and such issues are therefore well suited for determination on a class basis, by means of a single trial.[98] Only the last step in the analysis, pertaining to proof of injury to a particular plaintiff, requires individualized adjudication. Courts have therefore allowed class certification as to common issues of causation, while reserving issues of individual damages for summary trial procedures.[99] Also, as a practical matter, the aggregate of claims in the class often make it economically feasible for the class to afford the high cost of obtaining the best scientific evidence available, while the cost would be prohibitive if each individual plaintiff had to retain experts to repeat the same proof.

The process of developing expert evidence of toxic tort causation is lengthy and complex. The attorney is not merely a conduit for information to be provided to scientists and doctors who operate independently to give the necessary answers. Instead, the attorney must frame and conduct the full range of discovery—inspections of premises, interrogatories, requests for production of documents, depositions, and investigation through third party sources such as government agencies—in close cooperation with the team of experts. Only by working closely with experts will counsel learn which questions must be asked and gain the ability to understand the often highly technical answers to those questions. This approach assures that, to the extent possible, the information needed by the experts to formulate their opinions will be made

93. *Also Community Org.*, No. 723808 (Santa Clara County Superior Court Jan. 19, 1994) (Order on Class Certification). Personal injury and property classes were also certified by the same order.

94. Maciel v. Santa Clara Superior Court, No. H012220 (6th App. Dist. Mar. 15, 1994) (order denying petition for writ of mandate, etc.); Maciel v. Santa Clara Superior Court, No. S038890 (Cal. Apr. 28, 1994) (order denying petition for review).

95. *Potter*, 6 Cal. 4th at 1008.

96. *Lineaweaver*, 31 Cal. App. 4th at 1415.

97. *See, e.g., Cottle*, 3 Cal. App. 4th 1367. In *Cottle*, the Court of Appeal upheld the Superior Court's dismissal of personal injury toxic exposure claims based on a failure to submit expert evidence making out a *prima facie* case.

98. *See, e.g., Sterling*, 855 F.2d at 1196-97.

99. *See, e.g., Jenkins*, 782 F.2d 468; *Sterling*, 855 F.2d at 1188; *Alviso Community Org.*, No. 723808 (Santa Clara County Super. Ct. Jan. 19, 1994).

available to them, in a timely manner, and that the attorney will be sufficiently familiar with the material to present it at trial.

The following is a brief description of the steps required to prove injury in an airborne toxic exposure case, along with a description of some of the principal issues and the types of experts needed to address them. Many of the same, or analogous, issues will arise in any mass toxic tort case, regardless of the type of incident or exposure pathway.

A. The Amount of Chemicals Released

The foundation of the plaintiff's proof of causation in a toxic tort is the amount of chemicals released by defendants. The amount of the initial release is the critical factor that determines the concentration of chemicals to which residents downwind of the discharge may have been exposed. The concentration, and the length of time of exposure, determine whether a plaintiff received a "dose" sufficient to cause injury, according to established toxicological standards, and the amount of the release is a major common issue affecting all class members. Thus, every toxic tort case involves a battle between plaintiffs and defendants, to determine the amount of the chemical discharge. The following examples are typical.

In the immediate aftermath of the Sacramento River Spill, Southern Pacific Transportation Company ("SP") issued statements to public agencies indicating that only approximately 200 to 500 gallons of the herbicide metam sodium had leaked into the river from the railcar.[100] When daylight came, SP employees discovered a hole on the underside of the railcar, and SP then estimated that approximately 2/3 of the railcar's contents, or about 12,000-13,000 gallons, had leaked into the river.[101] SP's position was based upon its finding that the level of liquid measured approximately 1/3 of the way up the railcar as it rested in the riverbed. However, when SP pumped out and discarded the contents of the railcar, a hazardous waste analysis was required by the receiving facility. This analysis indicated that most of the liquid in the railcar after the incident was river water, and that only a very low percentage of herbicide remained. Eventually, in verified responses to interrogatories, SP acknowledged that the actual amount of herbicide discharged into the river was between 19,534 and 19,605 gallons, out of a total tankcar capacity of 20,240 gallons.[102] Thus, the figure of approximately 19,000 gallons was ultimately used by the State of California Environmental Protection Agency, and by plaintiffs' experts, as the basis for the calculations of the airborne toxic cloud released from the surface of the Sacramento River following the spill.

An analogous dispute arose in the General Chemical sulfuric acid case. In August, 1993, GCC prepared and issued a report which calculated the amount of the sulfur trioxide (SO_3) discharged from the tank car at 3.9 tons, and this figure was relied upon by defendant in numerous submissions to public agencies concerning the incident.[103] However, plaintiffs' investigations through document production, interrogatories, inspection of the railcar and a series of depositions, in conjunction with expert analysis, demonstrated a reasonable probability that the actual amount of SO_3 discharged to the atmosphere was at least 8.0 tons.[104] The settlement approved by the Superior Court in the fall of 1995 included a "plume," or physical representation of the toxic cloud, based upon an assumption of an 8 ton discharge.[105]

Similar issues can be anticipated in any mass disaster toxic tort case. It is in defendants' interest to minimize the estimated amount of the release, in order to minimize the resulting exposures and injury potential. Plaintiffs' interests are just the opposite. Counsel representing parties in such cases must retain highly-qualified chemists familiar with the particular manufacturing processes and chemicals involved, in order to properly analyze the activities that led to the incidents, to guide discovery of the facts necessary to determine the amount of the release, and then to calculate the amount that was probably discharged to the atmosphere. The importance of this expert analysis is magnified by the high probability that the toxic release resulted from an accidental, inherently unusual event that was not subject to contemporaneous or definitive measurement of the actual amount of the discharge.

100. *Why Spill Went Unchecked*, SAN FRANCISCO EXAMINER, July 16, 1991, at A12.

101. SP *Crew Blames Spill on Engine*, SAN FRANCISCO CHRONICLE, Aug. 2, 1991, at A23; CALIFORNIA OFFICE OF ENVIRONMENTAL HEALTH HAZARD ASSESSMENT, MEDICAL FACT SHEET — METAM SODIUM 1 (Aug. 5, 1991) (draft).

102. Southern Pacific Transportation Company's Answers to Plaintiffs' First Set of Interrogatories, No. 10., *In re* Sacramento Spill Cases I & II, No. 2617, 2620 (S.F. Super. Ct. Sept. 20, 1993).

103. Joint Decl. Of Thomas F. Schrag and Donald C. Arbitblit, *In re* GCC Richmond Works, No. 2906 (Contra Costa County Super. Ct. Nov. 22, 1995) (para. 16-20); *see* Decl. of Debra Belaga, *In re* GCC Richmond Works (Exh. 1-4).

104. Joint Decl. Of Schrag and Arbitblit, *supra* note 103. All of the SO3 mixed with atmospheric moisture to form the sulfuric acid mist that was carried downwind. CONTRA COSTA COUNTY HEALTH SERVICES DEPT., QUESTIONS AND ANSWERS ABOUT THE CHEMICAL RELEASE IN RICHMOND (July 28, 1993).

105. Joint Decl. of Schrag and Arbitblit, *supra* note 103.

B. Identification of the Chemicals to Which Plaintiffs Were Exposed.

After the amount of the toxic discharge has been determined, counsel and their experts must determine whether the chemicals that were discharged to the atmosphere remained in the same form or converted into other substances due to interaction with environmental chemicals and/or photochemical reactions. All of the subsequent toxicology research and proof of exposure and injuries depends upon accurate identification of the chemicals to which plaintiffs were actually exposed, and not merely those that were released during the incident. This analysis requires consultation with an atmospheric chemist familiar with such processes.

For example, in the *Sacramento River Spill* case, consulting scientists concluded that the herbicide metam sodium mixed with river water and then broke down into various chemicals, the most significant of which were methyl isothiocyanate (MITC), and hydrogen sulfide.[106] Toxicology literature searches demonstrated that each of these chemicals had unique injurious properties. A battle of the experts was waged as to the amount of each chemical present in the atmosphere in the Sacramento River canyon at different stages following the derailment. One of the central disputed issues pertained to the increased rate of breakdown of metam sodium in the presence of sunlight. Since the derailment happened at night, it was important to determine the rate at which the herbicide left the railcar, the rate at which the materials were carried downstream toward populated areas, especially the nearest towns of Dunsmuir and Castella, the locations of the plume on its course towards Shasta Lake, and the times when the plume was exposed to sunlight. These facts were necessary to estimate the atmospheric concentrations as accurately as possible for each location, in order to calculate plaintiffs' exposures. Because of the remoteness of the location of the spill, State Air Resources Board personnel did not obtain reliable atmospheric samples until July 17, 1991, three days after the incident, and substantially after the peak exposures had occurred. The absence of sufficient air quality sampling data is common in mass disaster cases, because of the sudden nature of the incidents and the broad areas affected by the discharges, leaving substantial room for expert debate.

In contrast to the Sacramento River Spill, the atmospheric chemistry in the General Chemical case was remarkably straightforward. Sulfur trioxide (SO_3) gas was expelled through a hole in the top of a railcar, at high pressures created by the overheating of the railcar's contents.[107] The SO_3 quickly mixed with atmospheric moisture (H_2O) to form sulfuric acid mist (H_2SO_4).[108] Consulting chemists ruled out the possibility that sulfuric acid could convert to other chemicals in the atmosphere. Thus, plaintiffs' toxicology consultants were able to limit their literature review and analysis to the injurious properties of sulfuric acid alone.[109]

C. The Scope and Pathway of the Chemical Plume

After determining the amount and identity of the chemical(s) at issue, the next critical step in the expert analysis is to determine where the chemicals traveled, and in what concentrations. In the case of an airborne toxic discharge, these questions are answered by a "plume study." Briefly stated, a plume study is a computer-generated model showing the geographic contours of the cloud of toxic materials, as well as the concentrations of the toxic materials at locations within those contours, over time. The plume image is then superimposed onto a street map, so that plaintiffs' probable exposures at particular times and locations can be determined. The need to prove exposure is a common issue affecting all plaintiffs, such that class treatment is appropriate.

Computer modeling programs were initially developed in the 1950's, to estimate exposure to radioactive fallout from nuclear explosions. Many such programs have since been developed, and computer modeling is widely approved and used by federal and state regulatory agencies, both to predict exposures from known, regulated sources and to estimate exposures caused by accidental discharges.[110] These models vary greatly in their degree of sophistication and applicability to particular circumstances. Some of the more advanced models are capable of taking into account the effects of the topography downwind from the site of the release, the size of the particles or droplets discharged, the rise of the plume after its discharge, and the rate of

106. James Cone *et al.*, *Persistent Respiratory Health Effects after a Metam Sodium Pesticide Spill*, CHEST 500-508 (Aug. 1994).

107. Edward J. Shields, *Analysis of what Caused the SO3 Release at General Chemical Corporation's Richmond Facility on July 26, in* Declaration of Debra Belaga, supra note 103 (filed June 19, 1995 as Attach. 1 to Exh. 3).

108. CONTRA COSTA COUNTY HEALTH SERVICES DEPT., *supra* note 104.

109. As discussed in part IV(D) *infra*, this seeming simplicity did not resolve the matter of toxic exposure and proof of injury, in the GCC case. Instead, the question of injurious effects at particular levels of concentration was hotly contested, based on conflicting medical and toxicological literature.

110. Ded. Of Walter Dabberdt, Ph.D. at para. 5, June 20, 1995, *In re* GCC Richmond Works, No. 2906 (Contra Costa County Super. Ct. Nov. 22, 1995).

fallout or deposition of such particles or droplets. The reliability of a plume study will depend in part upon its suitability for the particular incident. Counsel should anticipate an expert battle over the type of model used, the validity of the information entered to the program, and the admissibility of the resulting model.

Computer models of a chemical plume are generally created under the supervision and direction of an expert in the field of atmospheric transport modeling. Such experts commonly work with a meteorologist to gather and analyze wind and weather data from governmental and industrial sources, in order to obtain some of the essential information to run the program that produces the model. The atmospheric transport modeler will also work with a chemist capable of providing computer-readable data stating the amounts and rates of release of each chemical. Obtaining the information required to run the modeling program requires considerable time, effort and discovery. It is essential to begin that process long before the air transport modeler needs the data, in order to assure that results are available to consulting toxicologists and physicians well before trial.

D. The Types of Injuries That Can Be Caused by Particular Concentrations of Particular Chemicals

In order to determine the toxic properties of particular chemicals, and the types of injuries they can cause, counsel will consult with experts in the field of toxicology. Such experts may be physicians qualified to diagnose particular toxic exposure injuries, or they may be non-medical scientists. In either case, the specialist will conduct a literature review to determine the available information as to the toxicity of each substance to which plaintiffs were exposed. In cases of major incidents such as the Sacramento River spill, or General Chemical sulfuric acid exposure, state and county agencies generally conduct investigations of the health effects of the incidents, which may include such a toxicology literature review.[111]

The types and extent of injuries caused by toxic exposures are rife with controversy among scientists and doctors themselves. Naturally, these controversies carry over into the litigation arena. For example, in the GCC case, a State agency issued a report establishing a threshold level of 0.2 mg of sulfuric acid per cubic meter of air (0.2 mg/m^3), which the report concluded would be sufficient to cause an irritant injury to sensitive individuals.[112] However, defendant relied upon the standards of the American Congress of Governmental and Industrial Hygienists (ACGIH) which state that no health effects were expected among working adults exposed to 1.0 mg/m^3 of sulfuric acid for an 8-hour day, working 50 weeks per year. Defendant contended that the state report was not supported by existing data, and indicated its intention to move to dismiss injury claims by persons exposed to less than 1.0mg/m^3 if the case were not settled.[113] Plaintiffs, on the other hand, contended that the ACGIH standards applied only to healthy working adults, and not to a community that includes persons known to be more sensitive, such as infants, the elderly, and those with pre-existing respiratory conditions. Ultimately, the GCC settlement adopted the 0.2 mg/m^3 standard as a baseline for eligibility to seek enhanced compensation for serious injuries, but imposed further proof requirements, including documentation of medical visits, persistent symptoms, and medication, in order to obtain such compensation.[114] The settlement represented a compromise between views that would have been hotly contested at trial.

In many toxic tort cases, issues will arise as to the validity of laboratory experiments on animals for the purpose of proving the potential for harm to humans.[115] Other cases may involve controversies over the admissibility or weight given to epidemiology studies. An epidemiology study compares the incidence of a particular disease among persons exposed to an identified risk factor to the normal incidence of the disease in the general population. Where a statistically significant difference is found by the study, some courts permit experts to testify that the study demonstrates causation of injury to a particular individual.[116] In other cases, courts have permitted consideration of epidemiological studies in conjunction with other medical evidence to establish causation.[117]

E. Medical Proof of Injury to a Particular Plaintiff

The final link in the chain of proof of toxic injury causation is the doctor's opinion, that, to a reason-

111. California Office of Environmental Health Hazard Assessment ("OEHHA") is a branch of the California Environmental Protection Agency which issued such reports in both the Sacramento River spill and GCC cases.

112. California Environmental Protection Agency, OEHHA, Toxicologic Effects of Oleum and Sulfuric Acid 13 (Jan. 1994).

113. Decl. of Debra Belaga, *supra* note 103.

114. Settlement Agreement, *In re* GCC Richmond Works, No. 2906 (Contra Costa County Super. Ct. Nov. 22, 1995) (filed June 20, 1995).

115. *See, e.g., Potter*, 6 Cal. 4th at 989.

116. *See, e.g.*, Cantrell v. GAF Corp., 999 F.2d 1007, 1013-14 (6th Cir. 1993).

117. *See, e.g.*, Mendes-Silva v. United States, 980 F.2d 1482, 1485-86 (D.C. Cir. 1993).

able degree of medical probability, the chemical exposure caused or was a substantial contributing factor to the alleged injury.[118] The reliability and admissibility of such an opinion depends not only upon the doctor's qualifications as an expert, but also upon the type and quality of evidence developed to support that opinion. Have the chemists provided reliable calculations of the amount of toxic materials initially discharged, and identification of atmospheric breakdown products? Has the atmospheric transport modeler used that information, together with meteorological data, to demonstrate the probable exposure to a particular plaintiff at a specific time and location, using techniques and computer models that are generally accepted in the relevant scientific community? Has the toxicologist conducted a thorough search of the literature to determine that the exposure suffered by the plaintiff is sufficient to cause the type of injury that plaintiff alleges? If so, then the underlying information is of the type that "reasonably may be relied upon by [a medical] expert in forming an opinion"[119] as to causation.

The background information provided to the physician by other experts is necessary, but not sufficient, to prove the cause of an injury. The physician must also examine the patient's medical records from before and after the exposure in question, to determine whether the alleged injury may have resulted from an alternative cause. For example, in *Potter v. Firestone*, the California Supreme Court held that the jury could consider evidence of cigarette smoking as an alternative cause for plaintiffs' fear of cancer and emotional distress.[120] Family histories and predispositions are also relevant. The physician should conduct a clinical examination of the patient, and the failure to do so may result in exclusion of the expert opinion.[121]

Expert physicians will engage in vigorous debate as to the injuries potentially caused by particular exposures. Thus, in the Sacramento River spill cases, defendant SP filed expert declarations contending that the exposures that followed the spill were insufficient to cause any injuries other than short term irritation.[122] However, in response to numerous complaints of long lasting injuries, plaintiffs' counsel arranged for medical evaluations by physicians from the Department of Medicine and Center for Occupational and Environmental Health of the University of California at San Francisco. This research resulted in publication of a peer-reviewed article in a major professional journal, which documented long term respiratory injuries to exposed members of the community.[123] The peer review process is a significant indicator of the reliability of expert evidence,[124] and the research conducted by well-qualified pulmonologists and occupational health physicians was essential to establish proof of injury.

The types of medical specialties that may be required in a toxic exposure case are as varied as the injuries themselves. As in the *Sacramento River Spill* case, an airborne irritant may cause aggravation of asthma or the new onset of an asthma-like condition, requiring consultation with pulmomologists and occupational health physicians.[125] An oncologist specializing in toxic exposures would be consulted in the event that the literature search indicates that the toxics in question are carcinogenic.[126] A debate exists in both the legal and medical communities as to whether toxic chemicals cause damage to the immune system, and the admissibility of an immunologist's testimony in such a case may well be subject to the "new scientific evidence" standard of *People v. Kelly*.[127]

As a practical matter, in the event of an irritant exposure, early medical examination and treatment may be critical to plaintiff's ability to prove injury. Respiratory effects would normally be expected within twenty-four hours after the initial exposure,[128] and an early medical visit will document both the existence and severity of the condition, or the converse. On the other hand, many carcinogenic chemicals have long latency periods, and plaintiffs may not even know that they are being exposed to such substances for years after the exposure has taken place.[129]

118. *See* part III, *infra*.

119. Cal. Evid. Code § 801(b) (West 1996).

120. 6 Cal. 4th at 1010-12.

121. *See, e.g.*, *In re* Paoli Railroad Yard PCB Litigation, 35 F.3d 717 (3d Cir. 1994). Defendants will argue that such individual issues of damages predominate over comon issues in order to defeat class actions; however, most courts understand that individual issues of damages do not defeat class certification. *See, e.g.*, *Sterling*, 855 F.2d at 1188.

122. Decl. Of Dr. Harris Busch, Dr. John Salvaggio, and Dr. Henry Simmons, In Support of Sourthern Pacific's Opposition to Plaintiffs' Motion for Class Certification, *In re* Sacramento River Spill Cases, No. I & II, No. 2617, 2620 (S.F. Super. Ct. May 20, 1992).

123. Cone *et al.*, *supra* note 106, at 503-307.

124. *Daubert*, 509 U.S. at 593.

125. *See, e.g.*, Cone et al., *supra* note 106.

126. *See, e.g.*, *Potter*, 6 Cal. 4th at 977-78.

127. *See, e.g.*, *Id.* at 981-84 (discussing the effect of the "new scientific evidence standard of *Kelly*, 17 Cal. 3d at 24). The California Supreme Court described the differing conditions reached by different courts, and ultimately held that it lacked "an appropriate factual record for resolving whether impairments to the immune response system or cellular damage constitutes a physical injury for which parasitic damages for emotional distress ought to be available." *Id.* at 984.

128. Cone et al., *supra* note 106, at 503.

129. See, e.g., *Potter*, 6 Cal. 4th at 975-76. In that case, Firestone had dumped toxic wastes between 1963 and 1980. The materials leached into the ground water and caused contamination by a number of chemicals that were known carcinogens, and others that were strongly suspected to be carcinogens. Plaintiffs did not discover the contamination of their wells until 1984.

F. Summary

As demonstrated above, proof of injury in a toxic tort class action is a complex process requiring the attorney to conduct early, thorough and ongoing discovery and investigation into the amounts of toxic chemicals discharged, identification of the chemicals and breakdown products to which plaintiffs were exposed, the scope and direction of the toxic plume, the toxicity of the chemicals in question, and the likelihood that a particular exposure probably caused injury. Each link in the chain of causation will be the subject of expert debate. California cases concerning toxic injuries demonstrate that the likelihood of success at trial, and, in some cases, whether plaintiffs may proceed past the summary judgment stage, will depend upon the ability of counsel to develop admissible expert evidence supporting, or opposing, causation.

VI. Conclusion

The class action device is a superior method for resolving the multitude of claims arising from mass disaster toxic torts, which occur all too frequently in our modern, chemically-dependent society. The class procedure allows for a single trial of liability, punative damages and common issues pertaining to causation, preventing costly, repetitive litigation of the same matters by hundreds or thousands or plaintiffs. Global resolution of claims can be accomplished in a unified proceeding, and damages can be fairly distributed to all claimants under court supervision. Punitive damage classes may be ordered on a mandatory basis, as in the *Agent Orange*, *Exxon Valdez*, and GCC cases, under either the limited punishment or limited fund theories. In light of the substantial expenditures of time and money required to develop scientific and medical evidence in this expert-intensive field, resolution of common issues in a single trial is a practical necessity that allows all legitimate claimants to have their day in court.